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A New Species of Marine Interstitial Ostracoda of the Genus *Psammocythere* Klie from Hokkaido, Japan

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ABSTRACT—A new species of the genus *Psammocythere* is reported. It was collected from the intertidal sands at Kushiro, on the Pacific coast of Hokkaido. This genus also is the first record from Japan. Judging from the comparison between the morphology of the present new species and those of the other two *Psammocythere*-species so far known and *Bonaducecythere hartmanni* Mckenzie, 1977, *Bonaducecythere* Mckenzie, 1977 is considered to be a junior synonym of *Psammocythere* Klie, 1936.

INTRODUCTION

The present paper deals with a new interstitial species of the genus *Psammocythere* Klie, 1936 [1] (Psammocytheridae Klie, 1938) from Kushiro on the Pacific coast of Hokkaido [cf. 2]. This is the first record of the genus from Japan. Taxonomic relationship between *Psammocythere* and *Bonaducecythere* McKenzie, 1977 [3], both of which have many characters in common, is also discussed.

Materials were extracted from intertidal sands of various depths (20–50 cm) by means of decanting and sieving method with tap-water, using a sieve net with aperture size of 0.04 mm. The type specimens are deposited in the Zoological Institute, Faculty of Science, Hokkaido University (ZIHU).

Psammocythere oviformis sp. nov. (Figs. 1–4)

Psammocythere sp. Hiruta, 1985, p. 1007 [4]; Hiruta, 1987, p. 1112 [5].

Male (Holotype). *Carapace* (Fig. 1–1, 1–2) 0.269 mm in length, about 0.1 mm in height, elongate; anterior and posterior margins round, without any gape at both anterior and posterior parts; ventral part flattened; dorsal margin slightly arched. No special hinge structure present. Surface smooth, with scattered hairs of different lengths. Central muscle scars consisting of oblique row of three adductor scars, located somewhat anteriorly from the center. Anterior marginal infold broad; ventral and posterior parts of inner margins not clearly visible. Anterior and posterior parts and middle of ventral part of marginal zone broad. A row of several radial pore canals present along anteroventral part near shell margin; radial pore canals of other parts sparse.

First antenna (Fig. 2–1) six-segmented; first segment bare, about 1.75 times as long as anterior margin of second segment; second segment semitriangular in lateral view, with one very short anterodistal seta and one long posteroproximal seta, of which basal part is thickened and distal half is more slender than proximal half; third segment as long as second, with one short anterodistal seta; fourth segment about 1.3 times as long as third, with four anterior setae (two long and two short) on setiferous ledge and six setae of different lengths (three anterior and three posterior) on distal margin; fifth segment small, bare, about one-fourth the length of fourth; sixth segment about 1.5 times as long as sixth, with five distal setae (two long, two medium, and one short).

Second antenna (Fig. 2–2, 2–3) four-segmented; first segment as long as second and third combined; second segment three-fourths the length of

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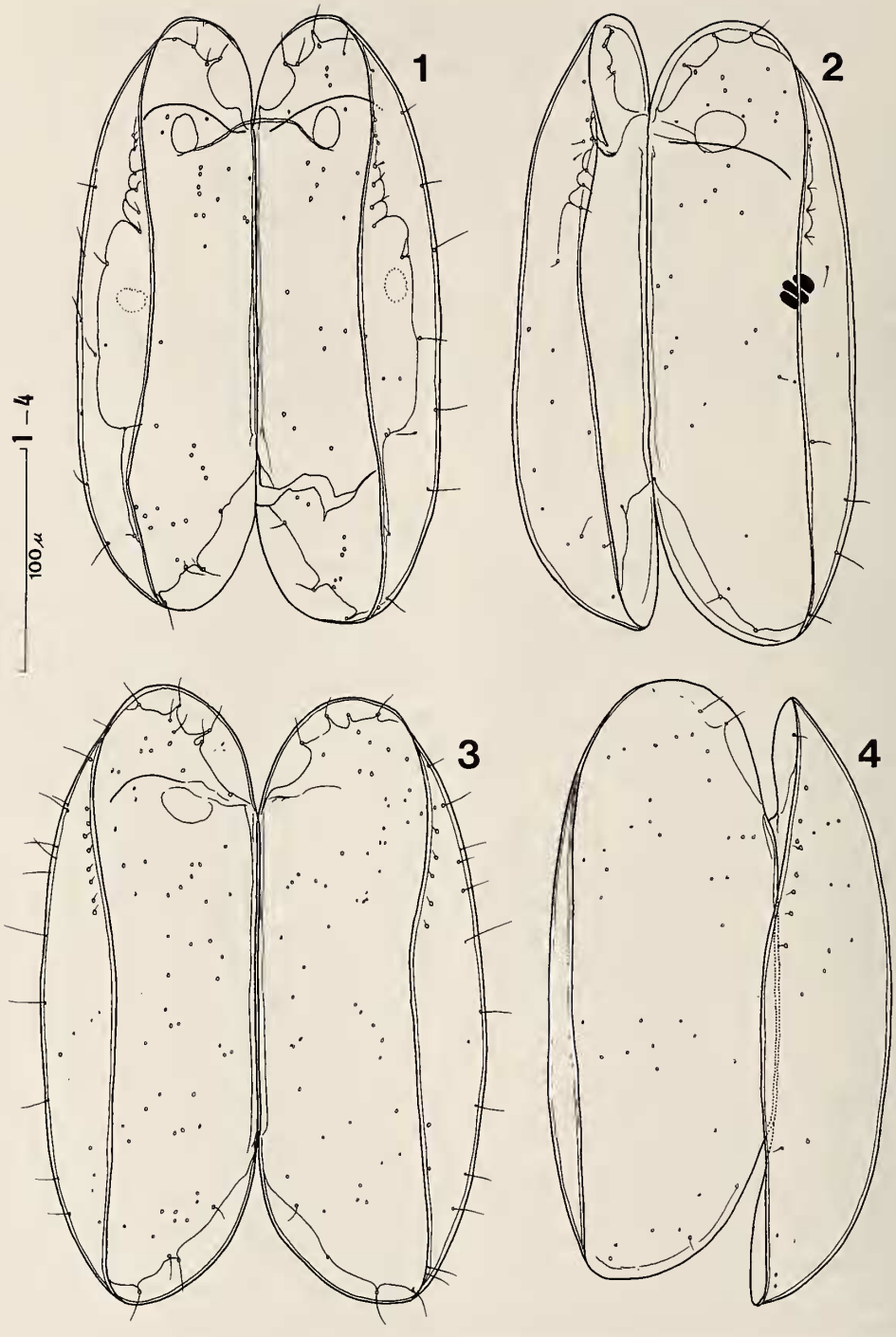

FIG. 1. *Psammocythere oviformis* n. sp. Ventral view of carapaces. Male. 1. Holotype; 2. Paratype. Female. 3. Paratype [allotype]; 4. Paratype.

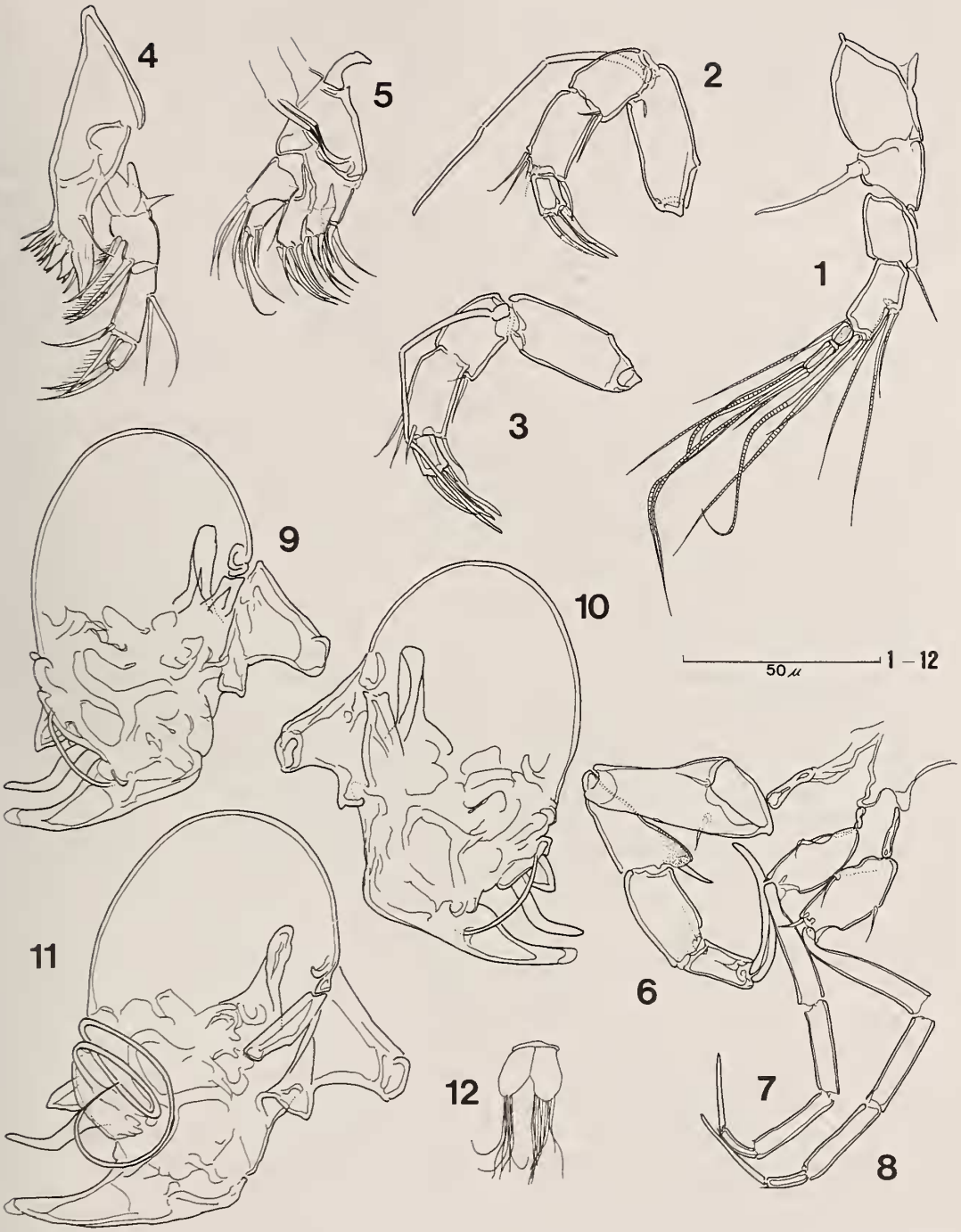

FIG. 2. *Psammocythere oviformis* n. sp. Male (holotype; 11 paratype). 1. First antenna; 2. Second antenna (right); 3. ditto (right); 4. Mandible; 5. Maxillula; 6. First walking leg; 7. Second walking leg; 8. Third walking leg; 9. Copulatory appendage (left); 10. ditto (right); 11. ditto (left); 12. Brush-shaped organ.

third, with two posterodistal setae (one long and one short); third segment with four setae (one posterodistal, one laterodistal, and two on setiferous ledges near anterodistal edge); fourth segment about one-half the length of third, with one short spine, one short seta, and three claws on distal margin. Exopodite (spinneret seta) three-segmented, extending beyond tips of terminal claws; length ratio of segments distally 1:0.8:1.

Mandible (Fig. 2–4). Masticatory process with one short seta on middle of anterior margin; distal edge toothed, with five strong and about five slender teeth of different sizes. Palp four-segmented; first segment with thumb-like structure directed proximally and short thin process near anteriodistal edge; second segment about three-fifths the length of third, proximal half of posterior margin swollen, from which three setae of different lengths arise, with two setae at posterodistal edge; third segment with two setae of subequal length on setiferous ledge of anterior margin and three posterodistal setae, of which one is very short; fourth segment about one-third the length of third, with three setae on distal margin.

Maxillula (Fig. 2–5) furnished with three masticatory lobes; first to third lobes with seven, four, and four distal setae respectively. Palp two-segmented; first segment with four setae of different lengths on anterodistal margin and one long setae on posterodistal edge; second segment with two long terminal and two short subterminal setae. Two mouth-ward directed setae present. Respiratory plate with about eight setae directed posteriorly.

First walking leg (Figs. 2–6, 4–1) four-segmented; first segment about 1.7 times as long as second, with two short setae (one anteromedial and one posteromedial); second segment widened anterodistally, distal third of anterior surface punctate, with one short strong seta on anterodistal edge; third segment bare, slightly shorter than second; fourth segment three-fourths the length of third, with strong distal claw which is about 2.5 times as long as forth segment.

Second walking leg (Fig. 2–7, 4–1) five-segmented; first segment about four-fifths the length of second, with two short setae (one anteromedial and one posteromedial); second to fourth segments bare; second segment about 1.5 times as long as third; third segment as long as fourh; fifth segment slender, somewhat curved, one-half the length of fourth, with terminal claw, which is 1.8 times as long as fifth segment.

Third walking leg (Figs. 2–8, 4–1) five-segmented; first segment about three-fourths the length of second, with three short setae (one anterodistal, one anteromedial, and one posteromedial); second to fourth segments bare; second segment about 1.4 times as long as third; third segment as long as fourth; fifth segment slender, somewhat curved, about one-half the length of fourth, with terminal claw, which is twice as long as fifth segment.

Eye absent. *Lip* almost the same as in female (Fig. 3–10); anterior surface of upper lip with a group of minute spines. *Brush-shaped organ* (Figs. 2–12, 4–1) consisting of a pair of lobes, whose length is about twice as long as width; each lobe with long filaments. *Copulatory appendage* (Figs. 2–9, 2–10, 2–11, 4–3, 4–4) oval in lateral view, with three processes of different shapes, of which one is short triangular, one is stick-like, and one is a large process tapering distally, and with long thin coiled tube. A pair of *seminla vesicles* (Fig. 4–2), which are coiled and certainly connected with the copulatory appendage, present in the middle of posterodorsal part of the body.

Female. Carapace (Fig. 1–3, 1–4) (outline and other structures) as well as *first antenna* (Fig. 3–1), *second antenna* (Fig. 3–2), *mandible* (Fig. 3–3), *maxillula* (Fig. 3–4), and *second* and *third walking legs* (Fig. 3–5, 3–6, 3–9) almost the same as in male. *First walking leg* (Fig. 3–5, 3–9) five-segmented; first segment slightly longer than second, with two short setae (one anteromedial and one posteromedial); second to fourth segments bare; second segment 1.25 times as long as third; third segment somewhat longer than fourth; fifth segment one-half the length of fourth, with terminal claw which is about twice as long as fifth segment. *Genitalia* (Figs. 3–8, 3–9, 4–5) composed of a tube which forms a loop near its proximal part; distal end of the tube inserted in a process directed posteriorly; large round process, whose distal margin terminates in a small sharp point, present above the preceding process.

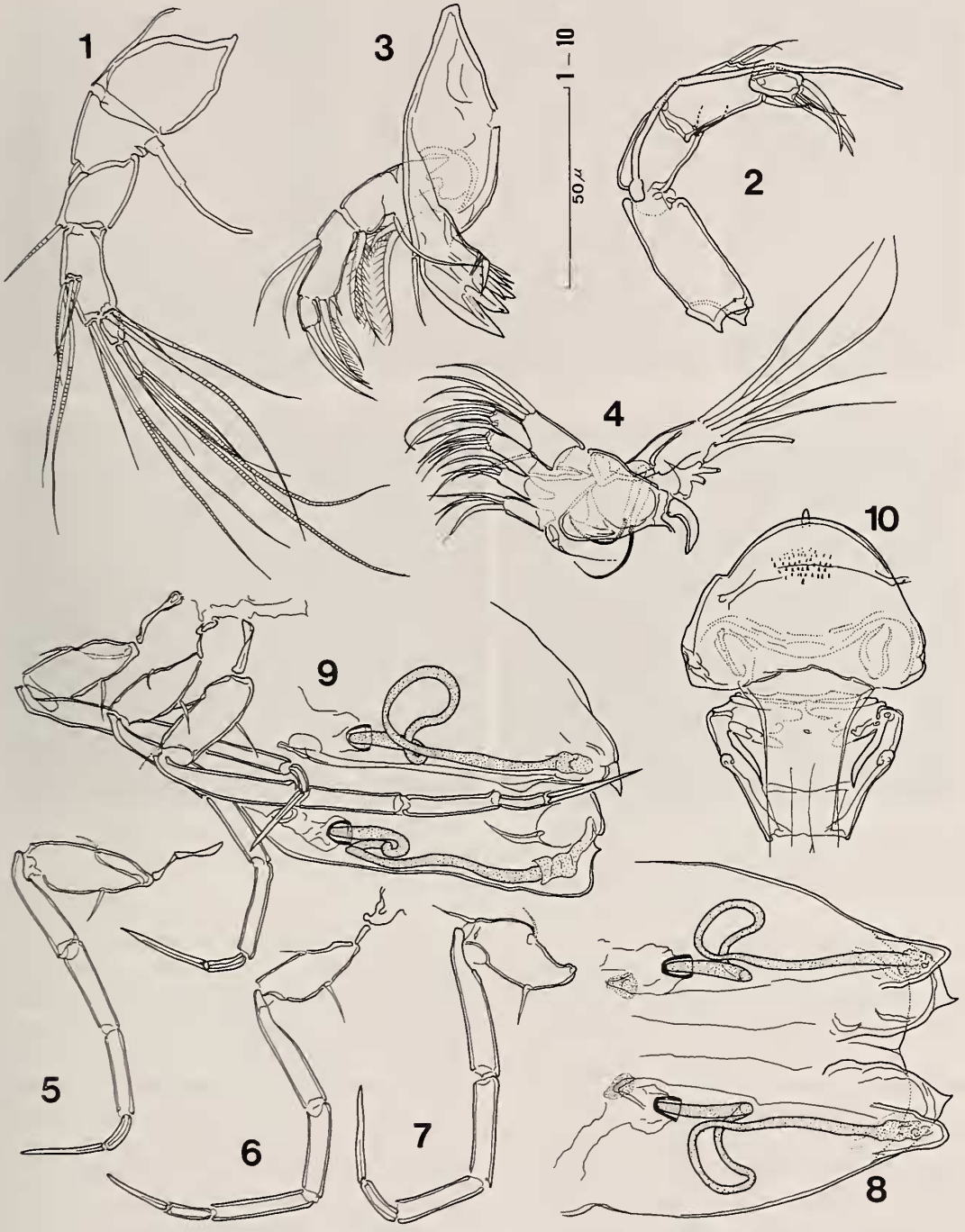

FIG. 3. *Psammocythere oviformis* n. sp. Female (paratype; 1–8 allotype). 1. First antenna; 2. Second antenna; 3. Mandible; 4. Maxillula; 5. First walking leg; 6. Second walking leg; 7. Third walking leg; 8. Ventral view of posterior part of body; 9. Legs and posterior part; 10. lip.

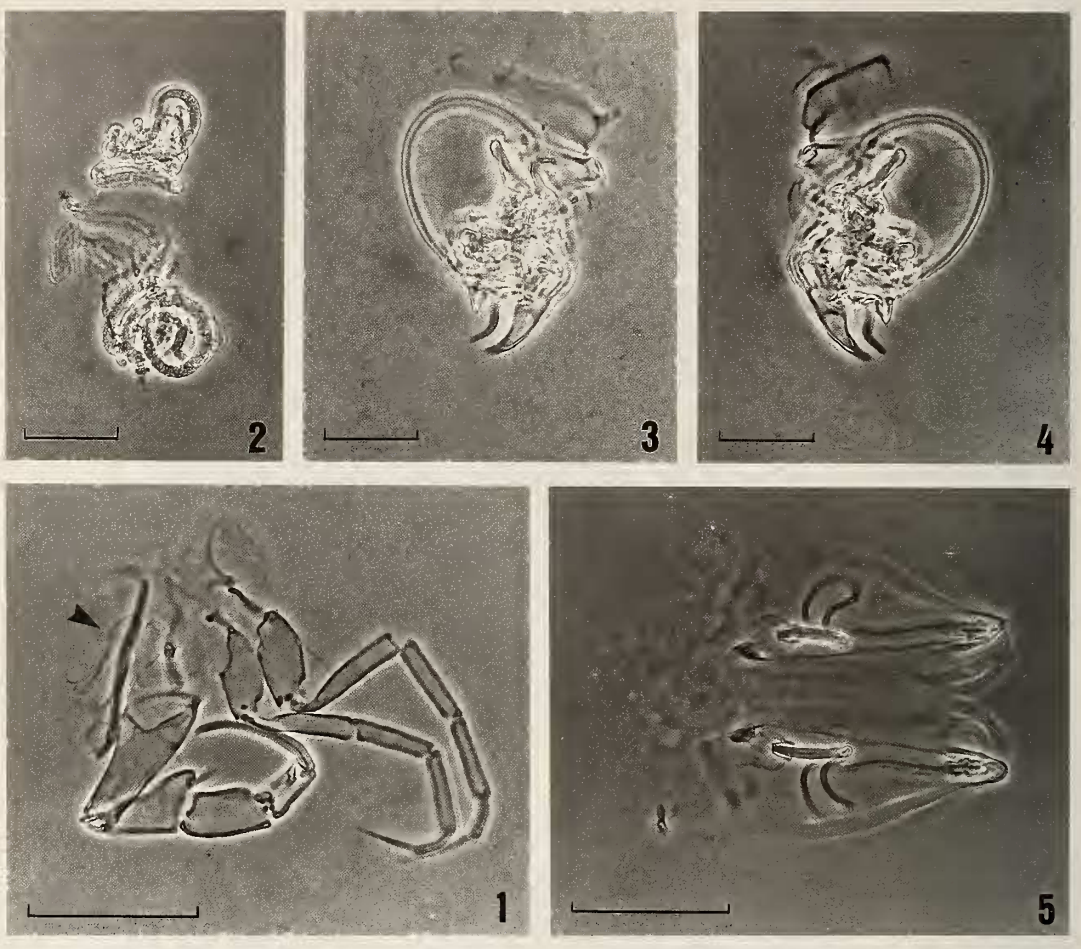

FIG. 4. *Psammocythere oviformis* n. sp. Male (holotype). 1. Legs and brush-shaped organ (arrow); 2. Seminal vesicle; 3. Copulatory appendage (left); 4. ditto (right). Female (paratype [allotype]). 5. Ventral view of posterior part of body. Each bar represents 0.05 mm.

Carapace length of paratypes (in mm): four males (0.278, 0.278, 0.257, 0.265: Carapaces of the other three sepcimens were broken during dissection); seven females (0.234 [allotype], 0.234, 0.267, 0.269, 0.265, 0.269, 0.265).

Specimens examined. Holotype ♂ ZIHU462; Paratypes 7♂♂ ZIHU463-469 and 7♀♀ ZIHU470-476, one of which is the allotype ZIHU470. All the type specimens were collected from the intertidal sands at Kushiro, Hokkaido (27-VI-'83, S. Hiruta leg.). The specific name is derived from the morphology of the basal part of the copulatory appendage.

Remarks. The present new species has five-segmented walking legs except for the first leg in the male. This structure, which characterizes the genus *Psammocythere* Klie, 1936 (Psammocytheridae Klie, 1938), is also found in *Bonaducecythere* McKenzie, 1977 (Bonaducecytheridae McKenzie, 1977) [3]. Since McKenzie [6] pointed out that Bonaducectheridae was a junior synonym of Psammocytheridae because of similarity of their legs as well as other appendages, these two genera have belonged to the family Psammocytheridae. According to McKenzie [6], the difference between *Bonaducecythere* and *Psammocythere* is recognized in the morphology of the carapace; namely, the former has the anterior margin with a gape, while the latter has broadly rounded anterior margin without any gape. Further, the coiled seminal

vesicle which is found in *Bonaducecythere* has not been recognized in *Psammocythere*. However, the present new species possesses the coiled seminal vesicle, while its carapace morphology belongs to the type of *Psammocythere* sensu McKenzie. In addition, the appendages of the present new species are very similar to *Psammocythere santacruzensis* Gottwald, 1973 [7] which has a carapace of *Bonaducecythere*-type. Accordingly, judging from these facts, *Bonaducecythere* McKenzie, 1977 should be considered a junior synonym of *Psammocythere* Klie, 1936, as Gottwald [7:18] has indicated it. Therefore, four species: *P. remanei* Klie, 1936 from Helgoland; *P. hartmanni* (McKenzie, 1977) from Mediterranean; *P. santacruzensis* Gottwald, 1983 from Galapagos; *P. oviformis* n. sp. are to be included in the family Psammocytheridae.

The present new species and *P. remanei* are clearly distinguishable from *P. hartmanni* and *P. santacruzensis* in the morphology of the carapace; the latter species have a gape in the anterior part of the shell, while the former ones have no gape. The first antenna of *P. remanei* consists of seven segments [cf. 7], which distinguishes this species from both *P. oviformis* n. sp. and the other two species whose first antennae possess six segments. In addition, *P. remanei* has three mouth-ward directed setae on the maxillula, while the other three species have two ones. Incidentally, the structure of the male first walking leg in *P. hartmanni* is much different from those of the other three species; namely, its second segment (first endopodite segment) has almost the same width along the whole length, and is furnished with a slender anterodistal seta, while in the other three species the segment is widened anterodistally, having a strong anterodistal seta. Although the copulatory appendages of these four species are similar to each other in general appearance, they are useful for discrimination among them.

Three species except for the present new species were collected from sublittoral sands, and are also reported as interstitial animals (see, Danielopol and Hartmann [8]). Thus, the members of the family Psammocytheridae are all interstitial dwellers at present. According to Gottwald [7], Psammocytheridae is considered as a sister group of all the other cytheracean groups, because the family is the only group having primitive four-segmented endopodite of the legs in the Cytheracea. In this connection, although Gottwald [7] made no mention of the members of the cytheracean family Kliellidae Schäfer, 1945 [9], they also have four-segmented endopodite of the legs, and further, were found from freshwater interstitial habitat in Greece (see, Hartmann [10]; Danielopol [11]). This primitive character within the Cytheracea seems to be preserved only in the interstitial environment.

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